PUBLICATIONS

1981

Forage Research in Texas

Departmental Technical Report No. 81-12

Department of Soil and Crop Sciences

SR - 0050

Project: H-6443

Workers: F.M. Rouquette, Jr.

Location: Overton

MINERAL COMPOSITION OF FORAGES GRAZED AT DIFFERENT INTENSITIES

OBJECTIVE:

Evaluate the influence of level of forage availability on mineral content of selected forages.

PROCEDURE:

Paddocks composed of common bermudagrass-crimson clover-ryegrass Coastal bermudagrass, Pensacola bahiagrass, and common weeping lovegrass were grzed at two or more levels of forage availability. Coastcross I bermudagrass was grazed at only the medium intensity. The heavily grazed paddocks had approximately 250-300 kg/ha available forage throughout the grazing period. The medium grazed paddocks had approximately 1000 kg/ha available forage; whereas, the lightly grazed paddocks had approximately 2500 kg/ha available forage throughout the grazing period. Forage samples for chemical analyses were taken to ground level from all paddocks. The mineral analyses, therefore, were expected to estimate the status of available forage rather than consumed forage. Forage samples were dried, ground, and prepared for mineral analysis by dry ashing. Phosphorus was determined by the phosphomolbydate blue color method. The other minerals assayed, potassium, calcium, iron, zinc, manganese, magnesium, and copper were determined via atomic absorption.

RESULTS AND DISCUSSION:

Percent phosphorus content of the forages tested is presented in Table 1. Phosphorus content was highest in the clover-ryegrass and in the immature Coastcross I bermudagrass, and lowest in weeping lovegrass. Forage from the lightly grazed paddocks was generally lower in percent phosphorus than forage from the other stocking rates. Percent potassium of forage followed a trend similar to that of phosphorus (Table 2). Potassium level of Coastcross I was considerably higher than that of the other forages (Table 3). However, the influence of grazing pressure did not appear to have the same effect as previously shown for phosphorus and potassium.

Percent iron, zinc and manganese are presented in Tables 4, 5, and 6, respectively. Bahiagrass had relatively high contents of zinc and manganese. The heavily grazed forages appeared to have slightly higher concentrations.

of minerals than the lightly grazed forages. Table 7 presents the magnesium status of those forages tested. Both lovegrass and Coastal had less concentration of magnesium than the other forages. The influence of season did not appear to have a significant effect on level of magnesium. Percent copper in the forages is shown in Table 8. The absolute levels of copper were lower than the other minerals tested. Coastcross I bermudagrass consistently had higher concentrations of copper; whereas, Coastal bermudagrass had some of the lowest copper levels.

Table 1. Phosphorus content of forage utilized at different grazing pressures.

	-%-										
	Common-Crimson-Ryegrass			Coastal			Coast-cross	Bahia		Love-grass	
Date	H	M	L	H	M	L	M	H	L	H	L
2-24	.38	-	.42	-	-	-	-	-	-	-	-
3-11	.40	.34	.38	-	-	-	-	-	-	-	-
3-24	-	.36	-	-	-	-	-	-	-	.24	.22
4-7	.34	.33	.33	-	-	-	-	-	-	.22	.19
4-23	.34	.40	.41	.28	.35	.36	.52	.28	.26	.22	.18
5-7	.42	.29	.28	.26	.27	.26	.31	.26	.26	.22	.14
5-19	.29	.33	.26	.31	.28	.26	.15	-	.27	.24	.16
6-4	.24	.24	.18	.24	.22	.19	.22	.20	.19	.10	.12
6-17	.20	.15	.14	.20	.18	.15	.16	.16	.16	.08	.08
7-2	.21	.19	.18	.26	.24	.19	.36	.22	.25	.19	.17
7-16	.17	.17	.15	.22	.22	.13	.25	.16	.19	.11	.10
7-28	.22	.20	.22	.29	.27	.21	.30	.22	.21	.18	.17
8-13	.22	.20	.20	.21	-	.20	.31	.24	.21	.17	.15
8-26	.20	.19	.20	.23	.22	.19	.30	.20	.20	.16	.12
9-15	.17	.19	.13	.23	.17	.19	.27	.14	.17	.10	.08
10-1	-	.26	-	.24	.23	.19	.34	.27	.22	.18	.16
10-15	-	-	-	.17	.22	.19	.36	.22	.24	.18	.16
10-28	-	-	-	.22	.25	.18	.28	.25	.20	-	.15
11-12	-	-	-	.16	.12	.18	.22	.20	.22	-	.17
11-24	-	-	-	-	-	-	-	-	-	.12	.12

Table 2. Potassium content of forage utilized at different grazing pressures.

	Common-Crimson-Ryegrass			Coastal			-%- Coast-cross	Bahia		Love-grass	
Date	H	M	L	H	M	L	M	H	L	H	L
2-24	6.7	-	4.4	-	-	-	-	-	-	-	-
3-11	2.9	3.8	4.7	-	-	-	-	-	-	-	-
3-24	-	3.0	-	-	-	-	-	-	-	1.5	2.2
4-7	3.7	2.6	2.8	-	-	-	-	-	-	1.5	1.4
4-23	5.3	3.2	3.1	2.9	2.6	2.6	6.0	2.1	2.7	1.4	1.4
5-7	2.7	2.8	2.4	2.0	2.3	2.1	5.3	2.2	2.3	1.7	1.4
5-19	2.1	2.1	2.8	2.4	2.3	2.1	4.6	-	2.5	1.6	1.3
6-4	2.1	2.4	1.7	2.0	2.0	1.9	2.3	2.1	2.9	1.5	1.4
6-17	1.7	2.4	1.5	2.1	2.1	2.4	2.4	2.1	1.7	1.2	1.3
7-2	2.3	2.0	2.1	2.2	2.4	1.8	5.3	1.8	2.1	1.3	1.3
7-16	2.3	2.3	1.8	2.2	2.0	1.7	4.0	1.8	2.1	1.3	1.0
7-28	2.1	1.9	1.8	2.4	2.2	1.9	3.6	1.8	1.8	1.1	1.2
8-13	2.4	2.4	2.5	2.5	-	2.4	4.0	2.7	1.8	1.4	1.4
8-26	2.0	2.1	2.3	2.3	2.4	2.1	4.6	2.0	1.9	1.2	1.3
9-15	1.8	2.5	2.6	2.2	2.1	2.0	3.6	2.0	1.7	1.1	1.0
10-1	-	3.0	-	2.1	2.1	1.9	3.6	2.3	2.0	1.3	1.9
10-15	-	-	-	2.0	2.0	1.8	2.8	2.2	2.1	1.4	1.2
10-28	-	-	-	1.8	1.5	1.7	2.8	1.9	1.8	-	1.1
11-12	-	-	-	0.9	0.8	1.6	2.8	1.9	1.6	-	2.3
11-24	-	-	-	-	-	-	-	-	-	1.0	1.7

Table 3. Calcium content of forage utilized at different grazing pressures.

	Common-Crimson-Ryegrass			Coastal			-%- Coast-cross	Bahia		Love-grass	
Date	H	M	L	H	M	L	M	H	L	H	L
2-24	.36	-	.37	-	-	-	-	-	-	-	-
3-11	.44	.50	.35	-	-	-	-	-	-	-	-
3-24	-	.56	-	-	-	-	-	-	-	.44	.35
4-7	.75	.43	.47	-	-	-	-	-	-	.35	.37
4-23	.43	.50	.38	.30	.31	.26	.47	.56	.35	.29	.30
5-7	.38	.35	.31	.27	.29	.26	.56	.47	.29	.29	.30
5-19	.34	.35	.36	.26	.29	.26	.50	-	.27	.29	.31
6-4	.34	.39	.38	.27	.27	.23	.43	.42	.29	.31	.28
6-17	.36	.41	.36	.30	.29	.29	.43	.40	.28	.40	.40
7-2	.31	.31	.33	.24	.26	.27	.35	.34	.25	.33	.32
7-16	.31	.40	.39	.26	.27	.23	.42	.32	.24	.32	.26
7-28	.29	.37	.35	.24	.24	.26	.45	.36	.25	.34	.33
8-13	.29	.35	.35	.20	-	.23	.33	.39	.23	.30	.25
8-26	.30	.34	.32	.25	.25	.25	.47	.34	.25	.26	.20
9-15	.28	.31	.33	.26	.26	.27	.49	.36	.25	.22	.18
10-1	-	.28	-	.25	.27	.23	.45	.30	.36	.23	.25
10-15	-	-	-	.23	.30	.25	.44	.40	.29	.26	.31
10-28	-	-	-	.28	.30	.28	.35	.27	.30	-	.31
11-12	-	-	-	.27	.25	.29	.47	.30	.33	-	.40
11-24	-	-	-	-	-	-	-	-	-	.35	.39

Table 4. Iron content of forage utilized at different grazing pressures.

	Common-Crimson-Ryegrass			Coastal			-%- Coast-cross	Bahia		Love-grass	
Date	H	M	L	H	M	L	M	H	L	H	L
2-24	.006	.009	.010	-	-	-	-	-	-	-	-
3-11	.006	.006	.002	-	-	-	-	-	-	-	-
3-24	-	.006	-	-	-	-	-	-	-	.002	.001
4-7	.005	.004	.005	-	-	-	-	-	-	.002	.0005
4-23	.008	.002	.009	.015	-	.010	.002	.001	.019	.002	.001
5-7	.005	.014	.002	.012	.010	.007	.001	.002	.012	.002	.0005
5-19	.002	.004	.004	.015	.009	.012	.002	-	.020	.001	.001
6-4	.012	.006	.005	.013	.002	.007	.002	.001	.010	.002	.001
6-17	.002	.004	.010	.005	.004	.004	.001	.001	.011	.002	.002
7-2	.002	.010	.010	.009	.011	.008	.002	.002	.012	.001	-
7-16	.008	.002	.010	.007	.009	.002	.001	.004	.011	.002	.002
7-28	.010	.005	.002	.009	.009	.009	.002	.002	.008	.002	.001
8-13	.009	.010	.001	.002	-	.002	.002	.002	.006	.001	.002
8-26	.007	.006	.005	.002	.002	.004	.002	.002	.008	.002	.002
9-15	.010	.009	.004	.008	.001	.004	.002	.004	.020	.002	.002
10-1	-	-	-	.011	.001	.008	.002	.002	.001	.002	.004
10-15	-	-	-	.002	.001	.001	.002	.005	.015	.002	.001
10-28	-	-	-	.011	.002	.008	.001	.020	.010	-	.002
11-12	-	-	-	.009	.009	.010	.002	.015	.013	-	.001
11-24	-	-	-	-	-	-	-	-	-	.001	.001

Table 5. Zinc content of forage utilized at different grazing pressures.

	Common-Crimson-Ryegrass			Coastal			Coast-cross	Bahia		Love-grass	
							-%-				
Date	H	M	L	H	M	L	M	H	L	H	L
2-24	.006	-	.008	-	-	-	-	-	-	-	-
3-11	.01	.02	.008	-	-	-	-	-	-	-	-
3-24	-	.009	-	-	-	-	-	-	-	.005	.004
4-7	.02	.009	.008	-	-	-	-	-	-	.004	.004
4-23	.011	.015	.012	.015	.015	.008	.008	-	.01	.01	.003
5-7	.009	.014	.003	.006	.014	.008	.009	-	.02	.009	.006
5-19	.006	.008	.004	.007	.007	.009	.004	-	.02	.008	.008
6-4	.006	.01	.006	.006	.006	.008	.004	-	.01	.002	.002
6-17	.006	.006	.005	.005	.007	.006	.004	-	.02	.002	.002
7-2	.005	.006	.005	.01	.008	.005	.006	-	.02	.074	.002
7-16	.006	.008	.008	.005	.006	.002	.006	-	.01	.004	.002
7-28	.005	.005	.005	.01	.009	.006	.004	-	.02	.011	.003
8-13	.007	.01	.008	.002	-	.002	.009	-	.01	.012	.007
8-26	.007	.006	.008	.005	.005	.014	.007	-	.01	.004	.003
9-15	.005	.006	.006	.006	.005	.005	.005	-	.01	.002	.003
10-1	-	.006	-	.007	.004	.005	.003	-	-	.015	.003
10-15	-	-	-	.002	.005	.002	.004	-	.013	.003	.003
10-28	-	-	-	.005	.004	.005	.004	.02	.018	-	.004
11-12	-	-	-	.005	.004	.008	.005	.008	.016	-	.003
11-24	-	-	-	-	-	-		-	-	.004	.003

Table 6. Manganese content of forage utilized at different grazing pressures.

	Common-Crimson-Ryegrass			Coastal			Coast-cross	Bahia		Love-grass	
							-%-				
Date	H	M	L	H	M	L	M	H	L	H	L
2-24	.005	-	.01	-	-	-	-	-	-	-	-
3-11	.009	.006	.007	-	-	-	-	-	-	-	-
3-24	-	.009	-	-	-	-	-	-	-	.018	.017
4-7	.007	.009	.01	-	-	-	-	-	-	.014	.018
4-23	.013	.011	.011	.007	.01	.014	.01	.03	.04	.014	.014
5-7	.012	.008	.009	.009	.007	.009	.009	.02	.02	.014	.012
5-19	.012	.013	.013	.01	.012	.013	.012	-	.03	.022	.015
6-4	.013	.01	.01	.009	.009	.01	.005	.02	.02	.016	.011
6-17	.01	.01	.01	.009	.009	.011	.012	.017	.02	.013	.013
7-2	.01	.01	.02	.013	.013	.012	.012	.018	.03	.029	.014
7-16	.02	.02	.02	.017	.012	.009	.018	.017	.02	.021	.017
7-28	.02	.02	.02	.015	.013	.013	.012	.028	.03	.022	.021
8-13	.01	.02	.01	.01	-	.008	.012	.032	.03	.019	.017
8-26	.01	.02	.02	.013	.009	.016	.011	.028	.04	.022	.017
9-15	.01	.02	.02	.013	.012	.012	.007	.027	.04	.021	.019
10-1	-	.01	-	.012	.013	.018	.007	.043	.04	.019	.016
10-15	-	-	-	.009	.013	.015	.009	.024	.045	.019	.012
10-28	-	-	-	.013	.01	.017	.01	.04	.04	-	.013
11-12	-	-	-	.019	.008	.016	.007	.035	.53	-	.025
11-24	-	-	-	-	-	-	-	-	-	.018	.016

Table 7. Magnesium content of forage utilized at different grazing pressures.

	Common-Crimson-Ryegrass			Coastal			-%- Coast-cross	Bahia		Love-grass	
Date	H	M	L	H	M	L	M	H	L	H	L
2-24	.25	-	.23	-	-	-	-	-	-	-	-
3-11	.21	.29	.16	-	-	-	-	-	-	-	-
3-24	-	.23	-	-	-	-	-	-	-	.16	.16
4-7	.22	.31	.24	-	-	-	-	-	-	.14	.12
4-23	.21	.41	.21	.17	.21	.17	.29	.30	.27	.14	.11
5-7	.23	.20	.20	.15	.17	.16	.30	.29	.22	.14	.12
5-19	.21	.20	.27	.15	.15	.15	.28	-	.23	.15	.13
6-4	.23	.25	.30	.25	.19	.16	.26	.25	.39	.12	.12
6-17	.27	.35	.29	.19	.19	.16	.23	.30	.21	.14	.12
7-2	.21	.27	.23	.13	.15	.16	.24	.25	.23	.14	.14
7-16	.24	.25	.24	.14	.17	.15	.27	.23	.25	.13	.11
7-28	.24	.25	.28	.15	.15	.17	.29	.26	.23	.14	.12
8-13	.24	.22	.23	.17	-	.19	.22	.32	.22	.15	.14
8-26	.22	.23	.23	.17	.15	.15	.26	.25	.23	.13	.12
9-15	.20	.25	.24	.15	.17	.16	.31	.24	.17	.11	.09
10-1	-	.18	-	.14	.19	.15	.25	.27	.27	.11	.10
10-15	-	-	-	.15	.23	.15	.28	.31	.23	.12	.13
10-28	-	-	-	.15	.17	.17	.28	.15	.20	-	.12
11-12	-	-	-	.16	.15	.17	.25	.22	.27	-	.14
11-24	-	-	-	-	-	-	-	-	-	.13	.12

Table 8. Copper content of forage utilized at different grazing pressures.

	Common-Crimson-Ryegrass			Coastal			-%- Coast-cross	Bahia		Love-grass	
Date	H	M	L	H	M	L	M	H	L	H	L
2-24	.001	-	.002	-	-	-	-	-	-	-	-
3-11	.001	.001	.004	-	-	-	-	-	-	-	-
3-24	-	.002	-	-	-	-	-	-	-	.001	.003
4-7	.006	.002	.004	-	-	-	-	-	-	.001	.001
4-23	.002	.004	.003	.009	.006	.002	.005	.004	.004	.005	.002
5-7	.0005	.003	.0005	.003	.007	.004	.005	.002	.005	.001	.001
5-19	.0005	.001	.0005	.003	.002	.002	.002	-	.007	.004	.001
6-4	.002	.007	.002	.003	.002	.003	.001	.002	.004	.001	.002
6-17	.003	.002	.003	.001	.002	.003	.003	.001	.009	.001	.001
7-2	.003	.002	.002	.005	.003	.002	.004	.002	.005	.002	.001
7-16	.003	.004	.004	.005	.002	.001	.004	.002	.004	.002	.003
7-28	.002	.001	.001	.004	.001	.004	.002	.007	.004	.003	.006
8-13	.003	.004	.001	.0005	-	.0005	.002	.002	.005	.002	.001
8-26	.001	.001	.004	.0005	.001	.003	.005	.001	.003	.001	.001
9-15	.002	.002	.004	.002	.001	.001	.003	.004	.001	.001	.001
10-1	-	.002	-	.003	.0005	.0005	.002	.002	.005	.001	.001
10-15	-	-	-	.0005	.001	.0005	.001	.001	.004	.001	.001
10-28	-	-	-	.0005	.0005	.002	.001	.006	.006	-	.001
11-12	-	-	-	.002	.002	.002	.001	.004	.007	-	.001
11-24	-	-	-	-	-	-	-	-	-	.001	.0005